§ 36.23 Engine intake system.

(a) *Construction.* The intake system (exclusive of the air cleaner) shall be designed to withstand an internal pressure equal to 4 times the maximum pressure observed in explosion tests, which are described in § 36.46, or a pressure of 125 pounds per square inch, whichever is the lesser. Joints in the intake system shall be formed by metal flanges fitted with metal or metal-clad gaskets, positively positioned by through bolts or other suitable means for secure assembly, or shall meet the requirements for flanged metal-to-metal flame-proof joints as required in § 36.20(b). Either type of joint shall withstand repeated explosions within the intake system without permanent deformation and shall prevent the propagation of flame through the joint into a surrounding flammable mixture.

(b) *Intake flame arrester.* (1) The intake system shall include a flame arrester that will prevent an explosion within the system from propagating to a surrounding flammable mixture. This flame arrester shall be between the air cleaner and the intake manifold and shall be attached so that it may be removed for inspecting, cleaning, or repairing. Its construction shall be such that it may be cleaned readily. The flame arrester shall be of rugged construction to withstand the effects of repeated explosions within the intake system, and the material of construction shall resist deterioration in service. It shall be so mounted in the equipment assembly that it is protected from accidental external damage.

(2) The parts of any flame arrester shall be positively positioned to produce a flame path that will arrest the propagation of an explosion and shall be so designed that improper assembly is impossible. In flame arresters of the spaced-plate type, the thickness of the plates shall be at least 0.125 inch; spacing between the plates shall not exceed 0.018 inch; and the plates forming the flame path shall be at least 1 inch wide. The unsupported length of the plates shall be short enough that deformation during the explosion tests shall not exceed 0.002 inch. Corrosion-resistant metal shall be used to construct flame arresters.

(c) *Air shutoff valve.* The intake system shall include a valve, operable from the operator's compartment, to shut off the air supply to the engine. This valve shall be constructed to permit its operation only after the fuel supply to the engine is shut off. In reverse operation the valve must open fully before fuel can be supplied to the engine.

(d) *Air cleaner.* An air cleaner shall be included in the engine intake system and so arranged that only clean air will enter the flame arrester. The resistance to airflow shall not increase rapidly in dusty atmospheres. Filters of the self-cleansing (oil-bath) type will be considered satisfactory for this application. Provision, satisfactory to MSHA, shall be made to prevent overfilling the oil-bath air cleaner.

(e) *Vacuum-gage connection.* A connection shall be provided in the intake system for temporary attachment of a vacuum gage to indicate the pressure drop under flow conditions. This opening shall be closed by a plug or other suitable device that is sealed or locked in place except when a gage is attached.

§ 36.24 Engine joints.

(a) *Cylinder head.* The joint between the cylinder head and block of the engine shall be fitted with a metal or metal-clad gasket satisfactory to MSHA held securely in position by through bolts or other suitable means to prevent a change in alignment. This joint shall provide an adequate flame barrier with the gasket in place.

(b) *Valve guides.* Valve guides shall be long enough to form an adequate flame barrier along the valve stem.

(c) *Gaskets.* All metal or metal-clad gaskets shall maintain their tightness during repeated explosions within the engine and its intake and exhaust systems to prevent the propagation of flame.

§ 36.25 Engine exhaust system.

(a) *Construction.* The exhaust system of the engine shall be designed to withstand an internal pressure equal to 4 times the maximum pressure observed in explosion tests, which are described in § 36.46, or a pressure of 125 pounds per square inch, whichever is the lesser.